

REMARKS

After entry of the instant Amendment, claims 1, 2, 4, 7-12, and 15-17, 19, 20, 22, and 24 are pending in the instant application, with claims 1, 7, 15, and 16 in independent form. Claims 18 and 21 are canceled. No new matter has been introduced by the amendment made herein. All independent claims have been amended and further recites the limitation that the curable liquid comprising a silicone composition is an addition-reaction curable liquid silicone composition, and dependent claims have been amended appropriately when necessary. This amendment does not constitute an introduction of a new matter, as this limitation was originally disclosed at, for example, paragraphs [0027] and [0028], and has been previously presented as claims 18, 21, and 23.

Applicants thank the Examiner for indicating allowable matter in claim 17.

Rejections under 35 USC §112, second paragraph

The examiner rejected claims 15, 22, and 24 under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the applicants regard as their invention because of insufficient antecedent basis. Claim 23 is canceled and the rejection thereof is moot. Claims 15 and 24 have been amended to include proper antecedent basis. Claims 22 and 24 are dependent and therefore are now in proper form due to the amendment of claim 15.

For the above reasons, the applicants believe that they have particularly pointed out and distinctly claimed the subject matter that they regard as their invention. Therefore, the applicants request that the rejection under 35 U.S.C. §112, second paragraph, be withdrawn and the claims allowed to issue.

Rejections under 35 USC §103(a)

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to

combine reference teachings. Second, there must be a reasonable expectation of success.

Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. MPEP §2143.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. MPEP §2143. Even where the combination of the references taught every element of the claimed invention, however without a motivation to combine, a rejection based on a *prima facie* case of obviousness was held improper. MPEP §2143.01. The level of skill in the art cannot be relied upon to provide the suggestion to combine references MPEP §2143.01. The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination MPEP §2143.01. A statement that modifications of the prior art to meet the claimed invention would have been “ ‘well within the ordinary skill of the art at the time the claimed invention was made’ ” because the references relied upon teach that all aspects of the claimed invention were individually known in the art is not sufficient to establish a *prima facie* case of obviousness without some objective reason to combine the teachings of the references MPEP §2143.01.

Hirano in view of Bottini

The examiner rejected claims 7-12, 15-16 under 35 U.S.C. §103(a) as being unpatentable over US 2002/153618 (Hirano et al.) in view of US 3808673 (Bottini) because Hirano describes forming semiconductor devices that includes a die chip mounted onto a surface of a substrate using an adhesive, bond wires, a silicone-containing overmold resin, and solder balls, and in certain configuration, applying the overmold resin by injection molding. The Examiner considers Bottini supplies information lacking in Hirano, i.e. the clamping force at the time of injection molding and the viscosity of liquid composition as well as the modulus of the cured product.

Claims 7, 15, and 16 have been amended and further recites the limitation that the curable liquid comprising a silicone composition is an addition-reaction curable liquid silicone composition. Claims 8-12, which depend on claim 7, also include this limitation.

Hirano identifies the wire sagging problem (paragraph [0006]) and the wire flow problem when insulating resin is injected under pressure (paragraph [0007]) during a transfer molding process. Hirano's solution to these problems is to manufacture devices with certain configurations, and in particular, to make the device smaller and shorten the wire length, as described in paragraphs [0080] to [0104]. Hirano does not teach or suggest the types of resin, and in particular an addition-reaction curable silicone composition, that would be advantageous for the reduction of wire sagging or wire flow problems. Hirano also does not teach, suggest, or offer guidance about the injection conditions to prevent wire sagging or wire flow problems. In fact, Hirano does not describe any characteristics of the resins or injection conditions. Upon reading Hirano, one skilled in the art learns one way to reduce wire sagging or wire flow: to manufacture a smaller device with a shorter wire length. Hirano teaches that there is no need for specific resins or conditions as long as one designs a semiconductor device as taught by Hirano. Nothing in Hirano would prompt a search for a suitable resin or condition for injection molding.

Applicants submit that Hirano does not provide any motivation to combine with Bottini, and therefore the *prima facie* obviousness is not established.

Even if one is motivated to look for a suitable resin or condition for injection molding, Bottini does not supply what lacks in Hirano. Bottini does not teach or suggest a resin suitable for injection molding or conditions for injection molding of a device with wire exposed. At column 4, lines 27-38, Bottini describes transfer molding of an emitter-detector pair encapsulated in clear silicone resin (line 32). Encapsulation encases the wire and thus, when transfer molding is carried out, Bottini is not concerned with protecting the wire. The encapsulation process is described at column 4, lines 2-13, but does not involve injection molding or transfer molding and offers little guidance regarding suitable conditions for injection or transfer molding.

Further, anticipating an argument that U.S. Patent 4722968 (Shimizu), which was previously cited against claim 18, may be combined with the other references cited hereto, Applicants wish to add that Shimizu does not cure the above described defect of Hirano and Bottini combined, because it also does not disclose any condition suitable for injection molding, let alone injection molding that would reduce wire sagging and wire sweep.

Therefore, Applicants submit that claims 7-12, 15-16 are not obvious, even if Hirano is combined with Bottini, and even if further combined with Shimizu.

Hirano in view of Bottini and Chaudhury

Claims 1, 4 and 19 stand rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of US2003/145940 to Chaudhury, *et al.* (Chaudhury). Claim 1 has been amended and further recites the limitation that the curable liquid comprising a silicone composition is an addition-reaction curable liquid silicone composition. Claim 1 as amended recites an addition-reaction curable liquid silicone composition in step g), which is essentially the method as recited in claim 7 as amended, and recites further limitations as steps a) through f) and h), of which steps c) and d) recite plasma treating a surface of the die attach adhesive and of the semiconductor die, respectively. Claims 4 and 19 are dependent on claim 1 and therefore includes all limitations thereof, and further recite limitations regarding the modulus, pressure and temperature. For reasons of rejection, the Examiner presents the same reasons discussed above for claims 7-12, 15-16 and further that Chaudhury discloses that surfaces of an adhesive and a semiconductor can be plasma treated to improve adhesion between surfaces. The examiner states that it would have been obvious to combine the disclosures of Hirano, Bottini, and Chaudhury.

As explained above, there is no motivation to combine Hirano and Bottini, and even if combined, the disclosure of Hirano in view of Bottini, further even in view of Shimizu, does not disclose all limitations of claim 7, and consequently, the corresponding limitations of claim 1, 4, or 19. Chaudhury does not cure this defect. Chaudhury offers no detail about resins and conditions used to seal wire-bonded semiconductor devices. Therefore, Applicants submit that claims 1, 4, and 19 are not obvious, even if Hirano is combined with Bottini and Chaudhury, and further with Shimizu.

Hirano in view of Bottini and Chaudhury, further in view of Takeuchi

Claim 2 stands rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of Chaudhury and U.S. Patent 6,475,629 to Takeuchi, *et al.* (Takeuchi). Claim 2 is dependent on claim 1 and therefore includes all of the limitations thereof, and further that the

die attach adhesive comprises a silicone die attach adhesive. The Examiner states that all limitations of claim 1 are disclosed in the combined reference of Hirano in view of Bottini, further in view of Chaudhury. The Examiner further states that the additional limitation of claim 2 is taught by Takeuchi.

As explained above, Applicants submit that there is no motivation to combine Hirano and Bottini, and even if combined, the disclosure of Hirano and Bottini, further combined with Chaudhury, or even further combined with Shimizu, does not show all limitations of claim 1, and consequently, the corresponding limitations of claim 2. Takeuchi does not cure the above described defect of such combined disclosure, because it does not disclose any particular type of resin or condition suitable for injection molding, let alone injection molding that would reduce wire sagging and wire sweep. Therefore, Applicants submit that claim 2 is not obvious, even if Hirano is combined with Bottini, Chaudhury and Takeuchi, and further with Shimizu.

Hirano in view of Bottini and Chaudhury, further in view of Shimizu

Claim 18 was rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of Chaudhury and Shimizu. Claim 18 has been canceled and its limitation has been subsumed in claim 1 as amended.

Hirano in view of Bottini and Chaudhury, further in view of Fishley

Claim 20 stands rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of Chaudhury and U.S. Patent 6654248 (Fishley). Claim 20 depends on claim 1 and includes all the limitation thereof, and further that the mold of claim 1 has a gate configured to introduce the curable liquid into the mold cavity onto a middle of a top of the product of step f) in the mold cavity. The Examiner states that all limitations of claim 1 are disclosed in the combined reference of Hirano in view of Bottini, further in view of Chaudhury, and that the limitation of claim 20 is taught by Fishley.

As explained above, Applicants submit that there is no motivation to combine Hirano and Bottini, and even if combined, disclosure of Hirano and Bottini, further combined with Chaudhury, or even with Shimizu, does not show all elements of claim 1. Fishley does not cure

the above described defect, because it does not disclose any particular resin or condition suitable for injection molding, let alone injection molding that would reduce wire sagging and wire sweep. Those limitations in claim 1, and therefore limitations in claim 20, are not all disclosed even if the cited references are combined. Therefore, Applicants submit that claim 20 is not obvious, even if Hirano is combined with Bottini and further in view of Chaudhury and Fishley, further even with Shimizu.

Hirano in view of Bottini, further in view of Shimizu

Claims 21 and 23 are rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of Shimizu. Claims 21 and 23 are canceled and is subsumed in claims 7 and 15 respectively, as amended.

Hirano in view of Bottini, further in view of Barrow

Claim 24 stands rejected under 35 U.S.C. §103(a) over Hirano in view of Bottini and further in view of US 4802873 (Barrow). Claim 24 depends on claim 15 and therefore includes all of the limitations thereof, and further that the mold has a gate configured to introduce the curable liquid into the mold cavity at a side corner of the product of step c) or step d) in the mold cavity. The Examiner states that all limitations of claim 15 are disclosed in the combined reference of Hirano in view of Bottini, and the additional limitation is taught by Barrow.

As explained above, Applicants submit that there is no motivation to combine Hirano and Bottini, and even if combined, disclosure of Hirano and Bottini, and even with Shimizu, does not show all elements of claim 7 or 15. Barrow does not cure the above described defect, even of the combined references, because it does not disclose any particular condition suitable for injection molding, let alone injection molding that would reduce wire sagging and wire sweep because the device Barrow is concerned with does not comprise wire parts. Those limitations in claim 15, and therefore limitations in claim 24, are not all disclosed in the combined reference of Hirano, Bottini, and Barrow even with Shimizu. Therefore, claim 24 is not obvious, even if Hirano is combined with Bottini and Barrow, even with Shimizu.

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The Examiner kindly indicated that claim 17 is allowable if written in an independent form. As explained above, Applicants submit that claims 1, 2, 4, 7-12, 15-16, 18-24 are not obvious over the art cited and combined by the Examiner, and therefore in condition for allowance. Therefore, Applicants submit all claims are in conditions for allowance and request withdrawal of all rejection reasons and allowance of all claims.

This reply is being submitted within the period for response to the outstanding office action in view of the petition for necessary extensions of time. You are authorized to charge deposit account 04-1520 for any fees necessary to maintain the pendency of this application. You are authorized to make any additional copies of this sheet needed to accomplish the purposes provided for herein and to charge any fee for such copies to deposit account 04-1520.

Respectfully Submitted,

/Erika Takeuchi/
Erika Takeuchi
Reg. No. 55661
1-212-486-3356